

Remarks

Restriction/Election

The telephone election of Group I and the species of Figure 8 (claims 34-41 and 43-46) is confirmed. Non-elected claims 47-54 have been canceled. However, upon the allowance of independent claim 34 rejoinder of non-elected species claim 42 (conductive polymer bump) will be requested.

Rejections Under 35 USC §112

Claims 34-41 and 43-46 have been rejected under 35 USC §112, first paragraph, as containing subject matter which was not described in the specification in such a way to reasonably convey to one skilled in the art that the inventor had possession of the claimed invention. In support of these rejections, the Office Action states: "The only portion of the specification that relates to the embodiment of Figure 8 is the last 6 lines on page 11 of the specification."

Claims 34-41 and 43-46 have been rejected under 35 USC §112, first paragraph, as containing subject matter which was not described in the specification in such a way to enable one skilled in the art at the time of the invention to make or use the invention. In support of these rejections, the Office Action states: "it's not clear what the parts of Figure 8 are or how they are assembled".

Claims 34-41 and 43-46 have been rejected under 35 USC §112, second paragraph, as being indefinite. In support of these rejections, the Office Action states: "It is not clear what all the claimed elements are and it is not clear how they are interconnected and interrelated to produce the desired results."

The rejections under 35 USC §112, are respectfully traversed. Although only the last six lines of page 11 of the specification relate to the embodiment of Figure 8, the entire specification is available to one skilled in the art to make or use this embodiment. Patent applications often

have several different embodiments, but it would be repetitious to describe each embodiment from scratch. Similarly, Applicant has elected the subspecies where the bump is metal. However, even though the specification contains only a sentence on the elected subspecies, the entire specification is available to satisfy the requirements of 35 USC §112.

In this regard, the fixture 141 of Figure 8 is basically the same as the fixture 13 of Figure 2. As such, the fixture 141 comprises a first plate, and a second plate attached to the first plate using a clamp 61. The TAB tape 143 in Figure 8 is basically the same as the TAB tape 41 shown in Figure 3. As such, the TAB tape 143 comprises a film (43-Figure 3), a bump (47-Figure 2) on the film for making a non-bonded electrical connection with a contact (27-Figure 3) on the die (21-Figure 3), and a conductive trace (45-Figure 2) on the film.

In Figure 8, the tape 143 is shown extending "beyond the confines of the fixture" (page 11, lines 31-33 of the specification). The main difference between the fixture 141 of Figure 8, and the fixture 13 of Figure 2 is that the connector leads 33 (Figure 2) are eliminated in fixture 141. In addition, the TAB tape 143 (Figure 8) includes an external connector 147 (Figure 8).

The embodiment of Figure 8 can be constructed by constructing the embodiment of Figure 3, but eliminating the leads 33 (Figure 2), the contact pads 37 (Figure 1), the electrical path between the contact pads 37 and the leads 33, and the bumps 48 (Figure 2). In addition, the TAB tape 41 which is described at page 9, lines 9-11 of the specification can be constructed with an electrical connector 147 (Figure 8) using techniques that are known in the art. The embodiment of Figure 8 provides a advantage during testing because as stated on page 7, lines 25-26, of the specification: "the flexible tape is used to directly connect

the die to an external connector connected to external test circuitry."

The above substitution of the elements of the embodiment of Figure 3, to the embodiment of Figure 8, would be readily apparent to one skilled in the art. It is thus submitted that the specification and drawings provide sufficient information for one skilled in the art to practice the claimed invention. It is further submitted that the claims, when read in light of the specification are definitive, and the interrelationship of the claim elements can be ascertained by one skilled in the art based on the teachings of the specification.

Rejections Under 35 USC §102

Claims 34-41 and 43-46 have been rejected under 35 USC §102(b) as being anticipated by Kattner et al., Enochs, Jamison et al., Greub et al., Littlebury et al., Malhi et al., Elder et al. '850 or Item 32636 of the Research Disclosure No. 326.

The rejections under 35 USC §102 are traversed as the Examiner has not established a prima facie case of novelty. Specifically, a proper 35 USC §102 rejection requires that a single reference identically describe each element of the rejected claims. However, the references have merely been cited without any analysis of the teachings of the references and how they relate to the present claims.

As held in In re Oetiker, 977 F.2d 1443, 1445, 24 USPQ2d, 1443, 1444 (Fed. Cir. 1992), the Examiner bears the initial burden of presenting a prima facie case, and only if that burden is met, does the burden of coming forward with evidence or argument shift to the applicant.

The rejections under 35 USC §102 are further traversed as it appears that the Examiner has combined the teachings of several references to support the rejections. Specifically, the Office Action states: "Test of wafers, die and multichip hybrids are considered equivalent. For support of the above

statement see Elder et al. '850. Note also that Enochs uses polyamide film. That which is tested by Jamison et al. is considered equivalent to a die."

However, a proper 35 USC §102 rejection must be based on a single reference describing all of the claimed features. Atlas Powder v. E. I. du Pont, 750 F.2d 1569, 224 USPQ 409 (Fed Cir. 1984), Jamesbury Corp. v. Litton Industrial Products, 756 F.2d 1556, 225 USPQ 253 (Fed. Cir. 1985).

The 35 USC §102 rejections are further traversed as the claims have been amended to recite features not taught by the references taken separately.

Specifically, Kattner et al. does not disclose a "test fixture" with a "tape" comprising "a plastic film" having "a bump on the film for physically and electrically contacting a contact on the die". Rather, in Kattner et al. probes 102 of a microprobe are formed by the ends of leads 104 which are mounted to a deformable member 101. As stated at column 4, lines 41-43 of Kattner et al.: "The ends of the leads are provided with raised portions which form the probes 102 as shown particularly in Figure 7". The probes 102 and leads 104 appear to be similar to conventional probe needles that can bend and deform with continued use. In the present case the bumps are "on the film" and therefore supported from deformation while being able to move to accommodate dimensional variations. Kattner et al. thus teaches a contact structure that is fundamentally different from the present contact structure.

In addition, the presently claimed "tape" element is a flexible element (see Figure 8) which provides an advantage for making electrical connections. In contrast, in Kattner et al. a plastic film is mounted to a backing plate (column 4, line 10-12). Plates are generally rigid rather than being flexible like films making electrical connections more difficult. In view of these differences the present claims are submitted to be novel and unobvious over Kattner et al.

Enochs is directed to a "package for connecting an integrated circuit chip to an etched circuit board (col. 1,

lines 39-40), rather than to a "test fixture for testing a semiconductor die" as presently claimed. In addition, Enochs does not disclose a "tape" with a "connector" that extends beyond the confines of the fixture as presently claimed. In view of these differences the present claims are submitted to be novel and unobvious over Enochs.

In Jamison et al. there is no direct electrical path through the apparatus (10-Figure 1) provided by a "tape" comprising a "plastic film", a "bump on the film", a "trace on the film" and an "electrical connector". Although the Jamison et al. apparatus (10-Figure 1) includes a film (50-Figure 1), the film is contained within the apparatus (see Figure 3). In addition, an interface board 45 makes the electrical connections between the film and the test circuitry (see column 3, line 5 of Jamison). The electrical connections must be made between the pads (55-Figure 1) on the film (50-Figure 1) and the pads (47-Figure 1) on the board (45-Figure 1). These electrical connections can add resistance to the electrical path through the apparatus, and require additional elements and process steps to make. With the present test fixture the "traces" provides a low resistance electrical path without the requirement of intermediate electrical connections. In view of these differences the present claims are submitted to be novel and unobvious over Jamison et al.

Greub et al. is directed to a "probe for integrated circuits in wafer form" rather than to a test fixture for a semiconductor die. In addition, Greub et al. does not disclose a "tape" with a "connector" that extends beyond the confines of the fixture as presently claimed. In view of these differences the present claims are submitted to be novel and unobvious over Greub et al.

In Malhi et al. '190 the connection circuit 32 and the compliant layer 31 do not extend from the socket 10, but rather are contained within the socket 10. In addition, the connection circuit 32 in Malhi et al. is bonded to wire bonds

25, which are bonded to external pins 26, which connect to test circuitry. The additional bonded connections do not form a "direct electrical path" as with the presently claimed "film", "trace on the film" and "connector". In view of these differences the present claims are submitted to be novel and unobvious over Malhi et al '190.

The Littlebury et al. reference is directed to an apparatus for burning in semiconductor wafers. On the other hand, the present claims are directed to a "test fixture for testing a semiconductor die". The Office Action states that "Testing of wafers, die and multichip hybrids are considered equivalent". This assertion is respectfully disputed. Wafers, hybrids and dice have different sizes, shapes, weights, and electrical characteristics. Different equipment and methods are typically used to test wafers, hybrids and dice. Although the '850 Elder et al. test socket can be used for testing both dice and wafers, there is no indication that the Littlebury et al. apparatus can be used to test discrete dice.

In addition, the Littlebury et al. apparatus includes a membrane 12 having bumps 19 for making the temporary electrical connections with the contact pads 21 on the wafer 11. The membrane is stated to be a "flexible printed circuit board material" (column 3, lines 21-25). Such a printed circuit board material is not a "tape" as claimed in the amended independent claims, and is not "polyimide" as claimed in claim 35. The presently claimed "tape" is more flexible than circuit board material, such that the "bumps" more easily conform to the topography of the die. In addition, the presently claimed "tape" can be biased against the die with less force, such that damage to the die is less likely to occur. Still further, the presently claimed "tape" can comprise TAB tape which is available in standardized bump patterns developed for semiconductor packaging. In view of these differences the present claims are submitted to be novel and unobvious over Littlebury et al '190.

The rejections based on the Research Disclosure reference are respectfully traversed based on the effective date of this reference being after the June 4, 1991 priority date for the present application. The Research Disclosure reference identifies the date of the reference as June 1991. However, June has 30 days, and 25 of those days are later than June 4. Without more evidence it cannot be assumed that the effective date of this reference precedes the present priority date.

In addition, the amended independent claims are believed to patentably distinguish from the Research Disclosure reference. In particular, this reference teaches "decals wiring 2" which makes the temporary electrical connections to the wafer 10. The decal wiring is not described as a "tape" comprising a "plastic film" as presently claimed, such that the Research Disclosure reference is not enabling on this feature. Accordingly, this reference does not place the presently claimed subject matter in the possession of the public. Accordingly, the present claims are submitted to be novel and unobvious over the Research Disclosure reference.

Conclusion

In view of the amendments and arguments, favorable consideration and allowance of claims 34-41 and 43-46 is requested. Also being filed with this Amendment is an IDS. Should any issues remain, the Examiner is asked to contact the undersigned by telephone.

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Respectfully submitted:



STEPHEN A. GRATTON
Registration No. 28,418
Attorney for Applicants

2764 S. Braun Way
Lakewood, CO 80228
Telephone: (303) 989-6353
FAX (303) 989-6538

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January 3, 2002
Date of Signature



Stephen A. Gratton
Attorney for Applicants

Marked Version Of Amended Claims Showing Changes

34. (amended) A test fixture for testing a semiconductor die comprising:

a first plate for receiving the die;

a second plate attached to the first plate for retaining the die therebetween; and

a [plastic film] tape placed between the first plate and the second plate for electrically connecting the die to test circuitry, the [film] tape comprising a plastic film, a bump on the film for physically and electrically contacting a contact on the die, a conductive trace on the film in electrical communication with the bump, and an electrical connector in electrical communication with the trace and connectable to the test circuitry;

with the connector, and at least a portion of the trace extending beyond a confine of the fixture, and with the bump, the trace, and the connector configured to provide a direct electrical path from the test circuitry to the contact on the die.

35. (amended) The fixture of claim 34 wherein the [plastic] film comprises polyimide.

39. (amended) A test fixture for testing a semiconductor die comprising:

a first plate for receiving the die;

a second plate attached to the first plate for retaining the die on the first plate; and

a [plastic film] tape for electrically connecting the die to test circuitry, the [film] tape comprising a plastic film, a bump on the film for physically and electrically contacting a contact on the die, a conductive trace on the film in electrical communication with the bump, and an electrical connector in electrical communication with the trace and connectable to the test circuitry;

with a first portion of the film placed between the first plate and the second plate and biased against the die;

with a second portion of the film and the connector extending beyond a confine of the fixture, and with the bump, the trace and the connector providing a direct electrical path from the test circuitry to the contact on the die.

43. (amended) A test fixture for testing a semiconductor die comprising:

a first plate for receiving the die;

a second plate attached to the first plate for retaining the die on the first plate; and

a [plastic film] tape for electrically connecting the die to test circuitry, the [film] tape comprising a plastic film, a bump on the film for physically and electrically contacting a contact on the die, a conductive trace on the film in electrical communication with the bump, and an electrical connector in electrical communication with the trace and connectable to the test circuitry;

a compressible elastomeric pad placed between the first plate and the second plate for biasing the bump against the contact;

with a first portion of the film placed between the first plate and the second plate and biased against the die by the pad;

with a second portion of the film and the connector extending beyond a confine of the fixture, and with the bump, the trace, and the connector providing an electrical path independent of the first plate and the second plate, from the test circuitry to the contact on the die.